

Official Battleship IOWA Crew Handbook

One Ship



One Crew

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Second Edition

© Pacific Battleship Center, 2013
250 South Harbor Blvd.
San Pedro, CA 90731

Revision 2.5, April 28, 2017

Acknowledgements

Adapted from *Battleship IOWA Training Manual, Rev. 0*, an unpublished manuscript compiled in 2012 by David Way, Curator of Battleship IOWA. The Handbook was developed in 2013 by the IOWA's Training Department for the ship's Crew Training Program and continues to be expanded as more information becomes available.

Researched, written and edited by:

Researchers

Rich Abele, Bob Maronde, Steve Nelson, Hal Puritz,
Jon Reed, Ron Rishagen

Editors

Managing Editor: Bob Maronde
Contributing Editors: David Canfield; Mike Getscher;
Barry Herlihy; David Way

Layout and Design

Bob Maronde

Graphics

Linda Ayers, Bob Maronde

Publisher

Battleship IOWA Training Department

Photo and Graphic Credits

Battleship IOWA Training Team, James Pobog,
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We gratefully acknowledge the continuing encouragement, assistance and support of the Battleship IOWA crew and the USS Midway Museum staff and volunteers.

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US Navy recruiting poster, 1919
James Henry Daugherty (artist) : 1889-1974

Preface

The dedicated men and women who serve on IOWA today take great pride in presenting and keeping this honored ship alive as a living testament to the past.

We humbly pay tribute to the men and women who worked so tirelessly to build her, to those men who bravely served on her decks and to those who gave their lives. *We salute you!*

As crew, we hope to pass on to the visitor a sense of pride and ownership of one of the greatest ships ever to sail the seas. To all who have served, we thank you for your service.

The goal of this Handbook is to provide crew members with basic information regarding the history and operation of Battleship IOWA and the Pacific Battleship Center. With a common body of knowledge, we will be able to give consistent and accurate information to our guests.

You are encouraged to further research IOWA's history through online and other resources and to participate in our crew training program.

Welcome aboard Battleship IOWA!

On behalf of the Pacific Battleship Center and the Battleship IOWA Museum, thank you for joining our crew.

We are counting on you to proudly show the ship to our guests. Please honor the history of IOWA by showing respect when talking about her and by keeping her clean.

Finally, show courtesy to your fellow crew members in your day to day interactions.

One Ship – One Crew

“One Ship - One Crew” is our mantra here aboard IOWA. This motto reflects our attitude toward each other and our visitors. A unified crew is important in celebrating the American Spirit and telling the history of IOWA.

You are encouraged to socialize with one another and get to know your fellow crew members!

Our Organization

Battleship IOWA is owned and operated by the Pacific Battleship Center (“PBC”), a California not-for-profit corporation exempt from federal income taxes under IRC § 501(c)(3). PBC receives no funding from city, county, state or federal governments. Additional information may be found on PBC’s website at www.pacificbattleship.com.

Battleship IOWA Museum

To the greatest extent possible, the exterior of the ship will remain as it was when IOWA retired in 1990. The majority of spaces along the ship's tour route will be restored to represent this period.

To better tell the story of the ship, some compartments may be converted to museum exhibit space subject to review and approval by PBC's board of directors.

Teamwork and the Open Door

As a member of IOWA's crew, you are part of a team - a team that respects and communicates with its members whether from different departments, paid staff, volunteers, members of management, vendors or contractors.

Management maintains an open door policy. Please come by and visit should you want to talk, have an issue to air, a question to be answered or simply need a boost.

We are pleased and honored to have you as a member of the crew and look forward to getting to know you better.

Cordially,
Jonathan Williams
President

Mission:

The mission of the Pacific Battleship Center is to celebrate the American spirit through the preservation and interpretation of the Battleship IOWA, to educate the public on the accomplishments and sacrifices of American patriots, and to engage our guests in unique and exciting ways that bring the ship to life by connecting the past with the future.

San Pedro

History

In 1542, Juan Rodriguez Cabrillo discovered the bay now known as San Pedro. The bay was used by Spanish ships as an anchorage starting as early as the 1540s.

European settlement began in 1769. After the United States defeated Mexico in the 1848 Mexican-American war, the harbor was improved and expanded under the guidance of Phineas Banning and John G. Downey, the seventh governor of California.

San Pedro was consolidated with Los Angeles in 1909. Today, the Port of Los Angeles is the largest port on the U.S. West Coast and busiest port in the country.

Fort MacArthur

In 1888, the War Department obtained a tract of land along the bay, expanding it in 1897 and 1910. This became Fort MacArthur in 1914, serving as a coastal defense site for many years. The fort is named in honor of lieutenant general Arthur MacArthur. His son, Douglas, later commanded American forces in the Pacific during World War II.

US Navy Battle Fleet Home Port, 1919-1940

Woodrow Wilson transferred 200 Navy ships from the Atlantic to the Pacific in 1919 when tension arose between the United States and Japan over the fate of China. San Diego Bay was too shallow for the largest ships so the battleships anchored in San Pedro Bay on Aug. 9, 1919.

By 1934, 14 battleships, two aircraft carriers, 14 cruisers, and 16 support ships were based at San Pedro earning the nickname "Battleship Country." On Apr. 1, 1940, the Pacific Fleet battleships sailed to Hawaii for annual fleet exercises. The ships remained in the islands to deter Japanese aggression and were attacked at Pearl Harbor on Dec. 7, 1941.

The Long Beach Naval Station and Long Beach Naval Shipyard on Terminal Island were part of the IOWA-class reactivation program in the 1980s. These facilities closed during the 1990s and were replaced by new harbor facilities.

Present Day

In 2011, San Pedro was selected as the final home port of Battleship IOWA (BB-61). On July 4, 2012, IOWA was commissioned as a museum ship and memorial recognizing the positive contributions of this battleship and its crew at critical moments in American history.

IOWA and the adjacent World Cruise Terminal anchor the northern end of the Port of Los Angeles **LA Waterfront** project. Ports O' Call Village anchors the southern end.

US Naval History - Battleships

The term “Battleship”: In the age of sail, naval battles were fought by forming a line of battle, sailing past each other and exchanging cannon fire. These powerful wooden warships were known as “*line-of-battle ships*.” The term “battleship” is a contraction of this phrase, coined around 1794.

As ironclads became dominant in the late 1800s, they, too, were referred to as battleships. In 1906, the British launched a revolutionary battleship, HMS *Dreadnought*. Ships prior to HMS *Dreadnought* are known as *pre-dreadnought battleships* and those afterwards as *dreadnoughts* or *super dreadnoughts*.

Battleship naming: In 1900 by law, battleships were to be named after states. By 1920, state names were the sole purview of battleships until the SSBN Ohio-class nuclear submarines in 1976. The Secretary of the Navy named each ship.

Battleship hull designation: In 1920, the Navy decided on a standardized two-letter ship designation system. The first letter is the class; the second letter is the subclass. Since battleships had no subclass, BB was adopted. BB-61 was the 61st battleship authorized to be built. BB-1 was USS *Indiana* with USS meaning *United States Ship*, a designation ordered by President Theodore Roosevelt in 1907.

Naval treaties: Battleships were a symbol of national power and prestige and a way to project power globally. Starting around 1890, a very expensive and economically draining world-wide arms race ensued. Even during the early 1900s, the value of the battleship was questioned because of its vulnerability to new technologies such as torpedoes and mines.

To prevent another arms race, in 1922 the US, UK, Japan, France and Italy signed the **Washington Naval Treaty** limiting battleships and battlecruisers to 35,000 tons/16-inch guns and all other ships to 10,000 tons/8-inch guns.

The **First London Treaty** (1930) and the **Second London Treaty** (1936) were continuations of the Washington Naval Treaty.

Treaty impact: To comply with the 1922 treaty, the Navy scrapped five partially-completed battleships, four partially-completed battlecruisers and cancelled others. Two battlecruiser hulls were converted to aircraft carriers, USS *Lexington* (CV-2) and USS *Saratoga* (CV-3).

Pearl Harbor battleships: All the battleships at Pearl Harbor were *dreadnoughts* constructed prior to the 1922 Treaty including the last ship built, USS *West Virginia* (BB-48).

These ships were characterized by 14- or 16-inch guns, reasonable armor protection, but were slow at 21-22 knots (24-25 mph).

US Navy fast battleships: Four battleship classes followed the US Navy *dreadnoughts* that were constructed prior to 1923. The commission dates of these ships are shown in brackets as follows:

• **North Carolina-Class**

- USS *North Carolina* (BB-55) [Apr. 9, 1941]
- USS *Washington* (BB-56) [May 15, 1941]

• **South Dakota-Class**

- USS *South Dakota* (BB-57) [Mar. 20, 1942]
- USS *Indiana* (BB-58) [Apr. 30, 1942]
- USS *Massachusetts* (BB-59) [May 12, 1942]
- USS *Alabama* (BB-60) [Aug. 16, 1942]

Both of these classes are “Treaty Battleships” because displacements were limited to 35,000 tons. However, the naval treaties became moot with the outbreak of WWII on Sept. 1, 1939.

The term “fast battleship” comes from the fact these ships were capable of 27 knots (31 mph).

• **IOWA-Class**

- USS *Iowa* (BB-61) [Feb. 22, 1943]
- USS *New Jersey* (BB-62) [May 23, 1943]
- USS *Missouri* (BB-63) [June 11, 1944]
- USS *Wisconsin* (BB-64) [Apr. 16, 1944]
- *Illinois* (BB-65) 22% completed, cancelled
- *Kentucky* (BB-66) 73% completed, cancelled

Kentucky's bow was used to repair USS *Wisconsin* after a collision with destroyer USS *Eaton* in 1956.

• **Montana-Class - Cancelled**

IOWA-Class Battleships

Class name: IOWA

Builders:

- USS *Iowa* (BB-61) and USS *Missouri* (BB-63), New York Naval Shipyard
- USS *New Jersey* (BB-62), USS *Wisconsin* (BB-64) and *Illinois* (BB-65); Philadelphia Naval Shipyard
- *Kentucky* (BB-66), Norfolk Naval Shipyard

Cost: US\$110 million per ship

In 2012 dollars, the cost is about \$1.8 billion using straight-dollar inflation. This does not take into account the cost of the armor and gun systems that are no longer produced.

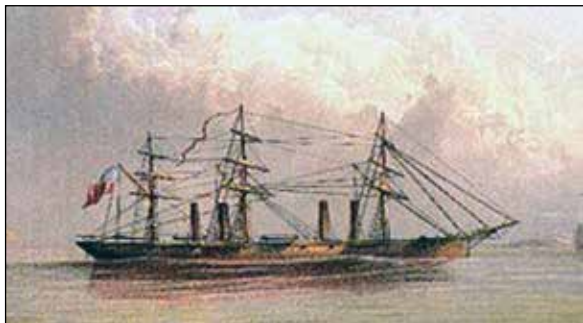
Class in commission: 1943-58, 1968-69, 1982-92

USS *Iowa* active duty: 1943-49, 1951-58, 1984-90

Preserved IOWA-class battleships:

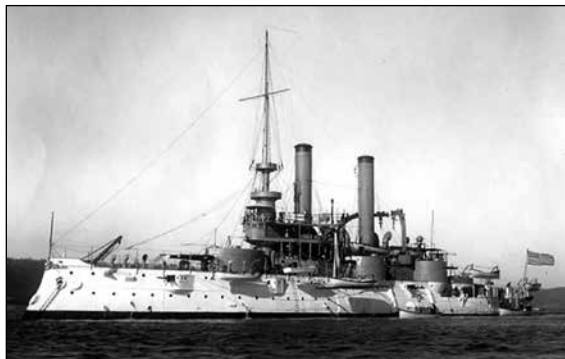
- **Battleship IOWA** (BB-61)
250 South Harbor Blvd., San Pedro, CA 90731
- **Battleship New Jersey** (BB-62)
100 Clinton Street, Camden, NJ 08103
- **Battleship Missouri Memorial** (BB-63)
Historic Ford Island, Pearl Harbor
63 Cowpens St., Honolulu, HI 96818
- **Battleship Wisconsin** (BB-64)
Nauticus, One Waterside Drive
Norfolk, Virginia 23510

IOWA Namesakes



Lithograph of USS *Ammonoosuc*

1st IOWA: USS *Ammonoosuc* was a steam frigate launched on July 21, 1864. In spring of 1868, the ship went to sea and averaged 17.1 knots, the highest sustained speed ever attained by a ship up to that time. She was renamed USS *Iowa* on May 15, 1869.



USS *Iowa* (BB-4)

2nd IOWA (BB-4): Launched Mar. 28, 1896, she fired the first shot in the Battle of Santiago de Cuba, July 4, 1898. On Apr. 30, 1919, USS *Iowa* was renamed *Coast Battleship No. 4*, the first radio-controlled target ship used in a fleet exercise. She was sunk Mar. 23, 1923, in Panama Bay.

3rd IOWA (BB-53): Laid down May 17, 1920, and was 31.8% completed when sold for scrap Nov. 8, 1923, to comply with the 1922 Washington Naval Treaty.



USS *Iowa* (BB-61) with USS *Indiana* (BB-58), 1944

4th IOWA (BB-61): Launched Aug. 27, 1942. The lead ship of the largest, most powerful class of American battleships ever built.

IOWA Chronology

Initial design: Early 1938

Final design: June 1938 when the 1936 London Naval Treaty was amended to allow agreed upon escalation clauses to occur.

Keel laid: June 1940

Builder: New York Naval Shipyard, Brooklyn, NY

Launched: Aug. 27, 1942

Commissioned: Feb. 22, 1943

The Navy Yard Shipworker Newspaper
New York Navy Yard, Brooklyn, NY
Aug. 27, 1942

Weighing, when completed, 45,000 tons, the *Iowa*, judging from available statistics, will be the heaviest warship ever built. She will be 880 feet long, only 200 feet shorter than the largest of ocean liners. Her launching weight will be the greatest in U.S. history, and according to available official figures, the greatest in the world. . . . Here are some facts that vividly bring home the size and power of the vessel:

- The plan design work on the *Iowa* required 429,000 man days and the construction 4,100,000 man days, both equivalent to one draftsman and ten mechanics working 6 days a week for 1,374 years.
- The amount of blueprint paper used for the issuing of plans is 175 tons, equal to a strip 30 inches wide and 1,100 miles long.

The Navy Yard Shipworker Newspaper
New York Navy Yard, Brooklyn, NY
Aug. 27, 1942

- The area of all decks and platforms comprises about 418,000 square feet, or 9 ½ acres.
 - The total length of shafting used to drive the vessel's propellers is 1,074 feet or 1/5 of a mile.
 - In its construction there are 4,209,000 feet or 800 miles of welding and 1,135,000 driven rivets.
 - The ventilation systems include 16 miles of ducts. [*14,140 valves and 80 miles of piping, 17 miles of which are used for refrigeration and cooling.*]
 - Fifteen miles of manila and wire rope are required for the vessel and its operation.
 - The total length of electric cable used is 250 miles, and the numerous conductors in some of these cables if placed end to end would reach 1,700 miles.
 - The capacity of the electric generator sets is 10,500 KW's or the equivalent to handle the industrial and domestic load of a city of about 20,000 population.
 - The operation of the ship involves 900 motors, 5,300 lighting fixtures, and 1,091 telephones.
 - The amount of paint required is 400,000 pounds, all told, enough to cover 7,200,000 square feet of surface one coat, sufficient to paint a fence 5 feet high and 273 miles long.
 - On her trial trip the ***Iowa*** will displace enough water to flood 46 acres of land or 993 city lots one foot deep.
-

World War II: USS *Iowa* transported President Franklin D. Roosevelt in Nov. 1943 across the Atlantic to meet with Joseph Stalin and Winston Churchill at the Tehran Conference.

In the Pacific theater, USS *Iowa* supported the Eniwetok, Kwajalein and Caroline Island campaigns. She was hit by two enemy shells fired from Mili Atoll suffering only minor damage. USS *Iowa* was in Tokyo Bay for the signing of the Japanese surrender. Awarded nine battles stars.

Decommissioned: Mar. 24, 1949, San Francisco Naval Shipyard

2nd commissioning: Aug. 25, 1951, San Francisco

Korean Conflict: USS *Iowa* provided gunfire strikes on North Korea and Wonsan Harbor islands. She rescued two downed pilots and fired over 4,500 16-inch shells during this war. USS *Iowa* fired more shells during Korea than WWII. Awarded two battle stars.

2nd decommissioning: Feb. 24, 1958, Philadelphia Naval Shipyard; Atlantic Fleet Reserve

3rd commissioning: Apr. 28, 1984, Pascagoula, MS, after 26 years in the reserve fleet

Cold War: During the Cold War era of the 1980s, USS *Iowa* provided humanitarian assistance to Costa Rica and Honduras, hosted President Reagan for the Statue of Liberty anniversary and International Naval Review in New York City, and provided escort duty for merchant ships in the

Gulf of Oman during the Iran-Iraq conflict. In Apr. 1989, an explosion within Turret 2 killed 47 sailors. President George H. W. Bush came aboard for the memorial.

3rd decommissioning: Oct. 26, 1990, Norfolk, VA; moved to Newport, RI, Sept. 1998

Awarded to Pacific Battleship Center:

Sept. 6, 2011, after 21 years in the reserve fleet (11 years on the East Coast and 10 years at Suisun Bay, Benicia, CA). The “Battleship of Presidents” was painted and refurbished in Richmond, CA, prior to her final tow to San Pedro, CA, on May 26, 2012.



Battleship IOWA, San Pedro, July 2013

Service Ribbons

IOWA earned nine battle stars for World War II service and two for Korean War service. The WWII Asiatic-Pacific ribbon on the below center, second row ribbon, has a silver star in the center which represents five battle stars along with the four bronze battle stars. The Korean Service Medal ribbon is on the third row, far right with the two battle stars.



IOWA's service ribbons - 04 Level bridge wing

Navy Meritorious Unit Commendation w/ 3 stars		Navy E Ribbon w/ 4 Battle E devices
American Campaign Medal	Asiatic-Pacific Campaign Medal w/ 9 service stars	World War II Victory Medal
Navy Occupation Service Medal	National Defense Service Medal	Korean Service Medal w/ 2 service stars

Armed Forces Expeditionary Medal	Navy Sea Service Deployment Ribbon w/ 2 stars	Philippine Presidential Unit Citation
Korean Presidential Unit Citation	Philippine Liberation Medal	United Nations Korea Medal



The above table corresponds to the five rows of service ribbons.




Efficiency/Excellence Awards

IOWA's bridge wing reflects the following efficiency and excellence awards from her 1980s Cold War service.



IOWA's awards - 04 Level bridge wing

IOWA's Efficiency/Excellence Awards		
	Strategic operations excellence award	
	Supply Department excellence award	2 times
	Electronic warfare excellence award	3 times

IOWA's Efficiency/Excellence Awards		
	Gunnery excellence award	
	Communications Department excellence award	3 times
	Navigation Department excellence award	3 times
	Damage control crews excellence award	3 times
	Battle E - Best ship handling, weapons employment, tactics and ability to fulfill mission objectives (command and control). Only one award per squadron	4 times

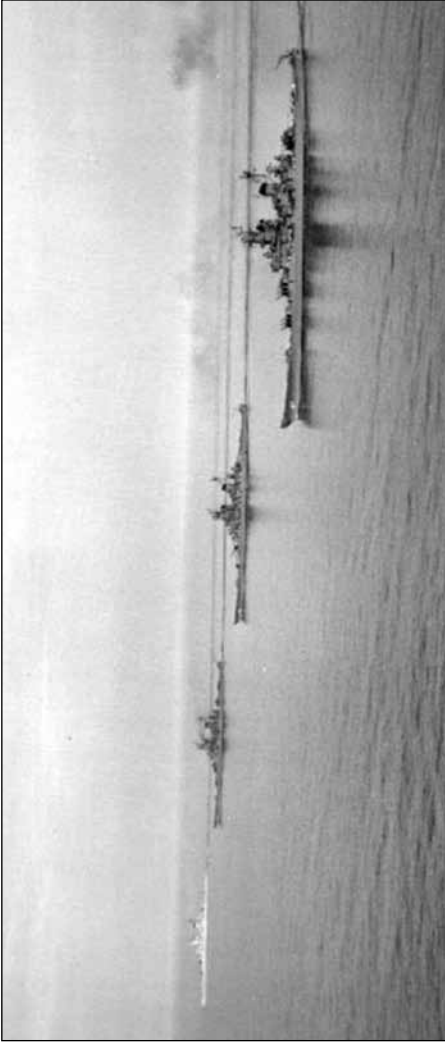
The 2nd funnel has a **red E** = Propulsion and Engineering Excellence. The forward Mk 37 5-inch gun director has a **white E** = Fire Control Excellence.



E - 2nd funnel



E - Forward secondary battery director (Sky 1)



Battleship Division 2 - June 7, 1954

The only time all four IOWAs were together. From near to far: USS *Iowa* (BB-61),
USS *Wisconsin* (BB-64), USS *Missouri* (BB-63), USS *New Jersey* (BB-62)

IOWA Statistics

Class and type: IOWA-class battleship

Nickname: “The Big Stick” based on President Theodore Roosevelt’s phrase, “Speak softly and carry a big stick.”

Motto: “Our Liberties We Prize, Our Rights We Will Maintain”

Hull structure: 217 hull frames spaced 4 feet apart. Even though there are frames forward, the frame numbering sequence begins at Frame 0 located at the first vertical structure just aft of the WWII 20 mm gun position on the bow and continuing to Frame 216 at the stern.

Length overall: 887 feet 3 inches

Length at waterline: 859 feet 6 inches

Beam: 108 feet 2 inches which is narrow enough to fit through the 110 foot-wide Panama Canal.

Draft: Between 36 and 38 feet depending on the load. Currently drawing 32 feet 6 inches aft and 27 feet forward because there are no fuel, ballast, powder, projectiles or provisions board.

Height:

- 216 feet from keel to top of mast (1980s)
- 116 feet from waterline to forward main battery director’s stereoscopic rangefinder (Spot 1)
- Currently, 174 feet from waterline to mast top
- Freeboard amidships to stern currently ~24 feet
- Freeboard at the bow currently ~40 feet

Displacement: The word “ton” has 3 meanings. Naval ship displacement is measured in long tons (2,240 lb), not short tons (2,000 lb). The metric ton or tonne is 1,000 kg or 2,204 lb.

The 1922 treaty definition of *standard* displacement is everything except fuel and reserve feed water for the boilers. *Full load* displacement includes fuel and feed water.

IOWA displacement:

- **1945:** Standard 45,000 tons, full load 57,540 tons
- **Cold War era:** Standard 48,425 tons, full load 57,500 tons
- **Current:** ~45,800 tons

Note: *Warships are measured in displacement tons while ocean liners are measured in gross registered tons, GRT, a measurement of total internal volume or space.*

Displacement distribution at 45,500 tons:

- **Hull:** 13,500 tons (28.9%)
- **Armor:** 18,700 tons (41.6%)
- **Armament:** 10,800 tons (24.0%)
- **Engines:** 2,500 tons (5.5%)

Complement:

- **Design:** 1,921 (117 officers, 1,804 enlisted)
- **WWII:** 2,788 (151 officers, 2,527 enlisted, 110 Marines). The complement swelled because of the added anti-aircraft guns.
- **1980s:** 1,568 (65 officers, 1,445 enlisted, 58 Marines)

Discone/discage antenna: Originally intended for the Naval Tactical Data System (NTDS) and added during the 3rd commissioning, the 44 foot tall discone/discage antenna coupler group on the bow is actually 2 antennas, each used for transmitting voice and data.

Wooden decks: ~48,000 square feet of teak provided insulation from the sun on metal decks and was not slippery. During the 3rd commissioning, some teak was replaced with Douglas fir. Douglas fir, while inexpensive, was an unfortunate choice because it is prone to rot.

Ventilators: The two main types of ventilators on IOWA's decks are for interior ventilation. The tall ones, "bucket" ventilators, are waterproof. The short ones, "mushroom" ventilators, are manually opened and closed. The main air intakes for the boilers are openings on the sides of the funnels and superstructure.



"Bucket" ventilator



"Mushroom" ventilator

Aircraft carried/supported

World War II: Carried three Vought OS2U Kingfisher (1943-45)/Curtiss SC-1 Seahawk (1945-48) floatplanes

Korea: Supported the following helicopters:

- Piasecki HUP-1
- Sikorsky HO3S-1

Cold War (1980s): Carried five (5) RQ-2 Pioneer unmanned aerial vehicles.

Supported the following helicopters:

- UH-1 Iroquois “Huey”
- CH-46 Sea Knight
- SH-2 Seasprite
- CH-53 Sea Stallion
- SH-3 Sea King
- SH-60B Seahawk



USS *Iowa* Kingfisher catapult launch, mid-1943

Protection and Armor

IOWA is designed to withstand the following types of attacks:

- Gun fire
- Torpedoes
- Aerial bombardment
- Mines

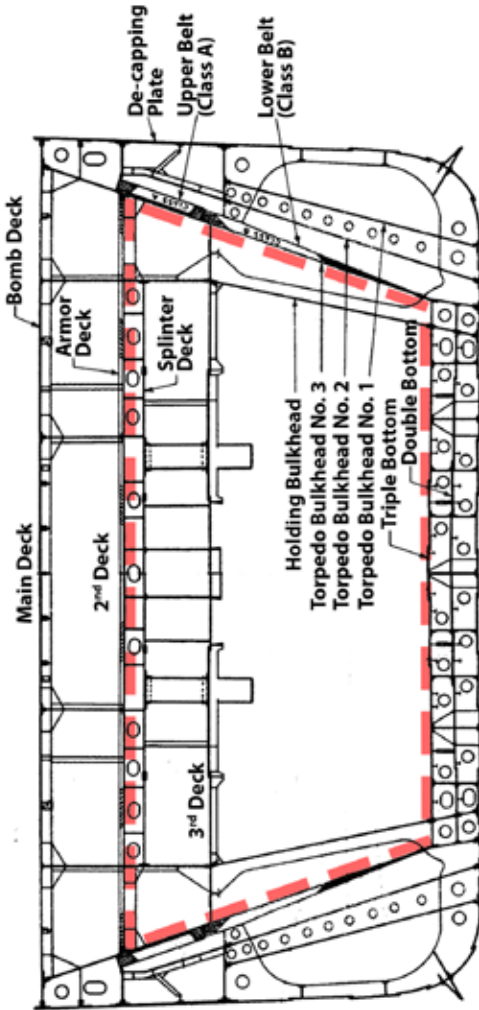
The cross-section diagram to the right shows the elements in IOWA's design for protecting against these attacks.

Triple bottom: Protection against near-miss bombs, mines and torpedoes exploding under the ship.

Torpedo bulkheads: Torpedo protection is multi-layered. Three bulkheads between the outer hull and the ship's interior form four voids for absorbing and dissipating the explosion. Torpedo Bulkhead No. 3 is the 19° inclined armored belt discussed later.

The citadel: An armored "box" protecting the ship's boilers, engine rooms, gun magazines and fire control systems. It runs from Frame 50 (forward of Turret 1) to Frame 166 (aft of Turret 3). The **belts** form the sides, **2nd Deck** the overhead, **triple hull** the bottom and **transverse bulkheads** the ends (Frames 50 and 166, respectively).

Other critical systems located outside the citadel such as turrets, conning tower, fire control directors and communications wiring are armored extensions of the citadel.



This hull cross-section shows the upper and lower belt (19° incline), torpedo bulkheads, 1.5" bomb deck (Main Deck), 6.0" armor deck (2nd Deck), 0.625" splinter deck and 0.625" 3rd Deck. The area inside the **red dashes** is the **citadel**.

Immune zone: IOWA is designed to withstand hits from 16-inch or smaller guns. However, protection is not defined by armor thickness but by something called the *immune zone*.

It is impractical to protect IOWA in all circumstances because the armor would be too thick and heavy. If an enemy was too close, direct fire from large caliber guns could penetrate IOWA. If the enemy was far away but within gun range, the plunging fire could penetrate the decks.

Between these two extremes is an area where IOWA is reasonably well protected. The original IOWA-class design specified protection against 16-inch/45 caliber shells between 18,000 yards (10.2 miles) and 30,000 yards (17.0 miles). One battle strategy would have been to keep the ship in the immune zone when engaging an enemy.

Types of armor: Four types of armor are used on the ship each with characteristics designed to meet specific threats:

- **Class A armor:** Class A is surfaced hardened on the outside face, the idea being to “de-cap” or strip the armor piercing cap off the projectile before it can penetrate into the ship. Case hardened steel tends to be brittle, but the cracks on the sides of the Turret 2 barbette are from the quenching process used in manufacturing.
- **Class B armor:** Class B or homogeneous armor is not surface hardened and so, has some “give.”

- **STS armor:** Special Treatment Steel or STS is homogenous armor plate under 4" thick intended for splinter protection. STS is similar to Class B and is used in ship structures.
- **Cast armor:** Cast directly into its final shape such as rangefinders and sight hoods.

16-inch turret (gun house): The gun house is the rotating portion of the turret that extends above the barbette and contains the 16-inch guns. The armor is a combination of Class A armor, Class B armor and STS plate.

- *Face plate:* 17" Class B armor on 2.5" of STS plate inclined at a 36° angle (19.5" total)
- *Side plates:* 9.25" Class A armor over 0.75" STS plate (10.0" total)
- *Back plate:* 12" Class A armor
- *Top:* 7.25" Class B armor

16-inch barbette: The barbette is the armored, non-rotating portion of the turret directly under the gun house and is 11.6" to 17.3" Class A armor. The abeam portion is 17.3" tapering at the quarters to 14.8" and finally tapering to 11.6" dead ahead and astern.

5-inch enclosed mounts: 2.5" STS plate

Armored conning tower: 17.3" Class B armor. Each door weighs 4,000 lb or 2 tons. IOWA is unique because the armored conning tower has 3 levels: 03 Level, 04 Level and 05 Level. IOWA's sisters do not have an armored 03 Level.

Belts: The belts form both sides of the citadel and are a combination of Class A and Class B armor. Each belt runs horizontally on the port and starboard sides of the ship from Frame 50 just forward of Turret 1 to Frame 166 just aft of Turret 3 and vertically from 2nd Deck to the triple bottom. Each belt is 12.1" thick starting at 2nd Deck, tapering to 1.62" at the triple bottom and slanted at a 19° angle (See previous cross-section diagram).

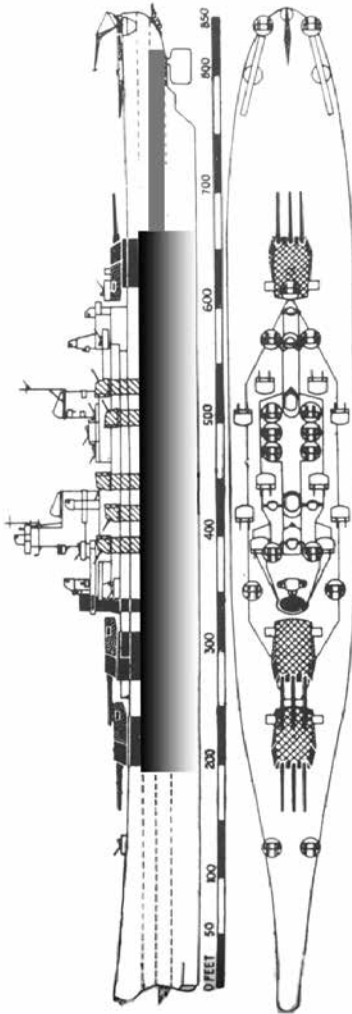
Transverse bulkheads: 11.3" Class A armor protecting the forward and aft ends of the citadel.

Bomb deck: Main Deck is 1.5" STS plate running from Frame 50 to Frame 166. The idea is to detonate shells and bombs before they can penetrate further into the ship.

Armor deck: 2nd Deck is 4.75" Class B armor laid on top of 1.25" STS plate (6.0" total) running from Frame 50 to Frame 166. This is the overhead of the citadel.

Splinter Deck/3rd Deck: Between 2nd Deck and 3rd Deck is a splinter deck consisting of 0.625" STS plate. The purpose of this deck is to catch spall or splinters from hits on the armor deck (2nd Deck) above. 3rd Deck is also 0.625" STS plate.

Steering gear: Protected within a 13.5" Class A armored compartment.



Even though this diagram does not show the bomb or armor decks, it gives a sense of IOWA's basic armor layout. Note how the belt is tapered toward the keel.

Armament

IOWA's armament evolved to counter new threats and improve offensive capability. The original design focused on ship gun duels with shore bombardment as a secondary role. During WWII, aircraft became the primary threat so IOWA was fitted with an impressive array of anti-aircraft guns.

All 20 mm Oerlikon anti-aircraft guns were removed most likely prior to the 1949 decommissioning as they were considered obsolete. By the 3rd commissioning in 1984, all 40 mm Bofors anti-aircraft guns were gone along with eight 5-inch/38 cal. guns (four twin mounts).

To increase IOWA's offensive capability, Tomahawk cruise missiles and Harpoon missiles were added in the 1980s. Four 20 mm Phalanx CIWS (Close-in Weapon System) guns for missile protection and eight .50 cal. heavy machine guns for protection against small craft attacks were also added.

1944 Configuration:

- 9 – 16-inch/50 cal. Mark 7 guns
- 20 – 5-inch/38 cal. Mark 12 guns
- 76 – 40 mm/56 cal. Bofors (19 quads) AA guns
- 52 – 20 mm/70 cal. single Oerlikon AA guns

1955 Configuration:

- 9 – 16-inch/50 cal. Mark 7 guns
- 20 – 5-inch/38 cal. Mark 12 guns
- 76 – 40 mm/56 cal. Bofors anti-aircraft guns

Cold War (1980s) Configuration:

- 9 – 16-inch/50 cal. Mark 7 guns
- 12 – 5-inch/38 cal. Mark 12 guns
- 32 – BGM-109 Tomahawk cruise missiles
- 16 – RGM-84 Harpoon anti-ship missiles
- 4 – 20 mm Phalanx Close-In Weapon System
- 5 – Stinger surface-to-air missile firing positions
- 8 – .50 cal. heavy machine guns (4 per side)

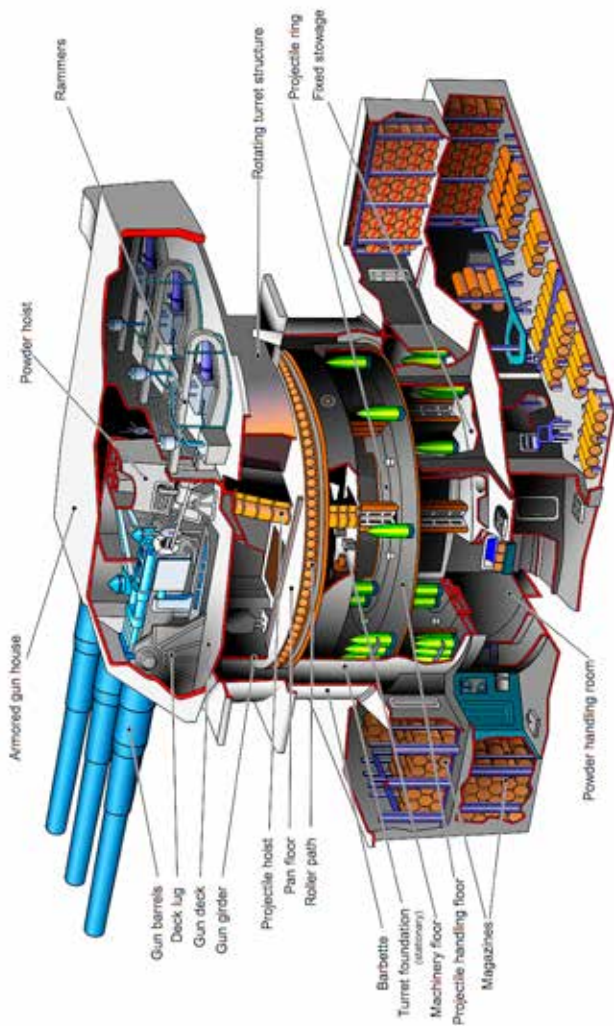


USS *Iowa*, Dec. 27, 1944, entering dry dock

The date is per the ship's log.

Notice the conning tower has not yet been enclosed.

Official Battleship IOWA Crew Handbook



16-inch Main Gun Battery

Main battery: 16-inch 50 caliber Mk 7 gun, the largest, most destructive naval gun ever mounted on an American warship.

Navy caliber: The ratio between bore diameter and bore length (rifled portion of the barrel). 16-inch x 50 calibers = 800" (66.6 feet), the rifled bore length.

Gun layout: (See turret cutaway) three rifled guns per armored turret. Two turrets forward, one aft

Turret traverse: ~300° turning arc at 4° per second. Full traverse 75 seconds

Gun elevation turrets 1 & 3: Each gun barrel can be raised and lowered separately from -2° to +45° at 12° per second. Full elevation in just under 4 seconds

Gun elevation turret 2: Each gun barrel can be raised/lowered separately from 0° to +45°.

Gun barrel recoil: 47"

Rate of fire: ~two rounds per minute

Range: ~24 miles, 1½ minute flight time to target. On Jan. 20, 1989, IOWA fired a 16-inch shell off Vieques Island, Puerto Rico, 26.9 miles, a record.

Broadside firing sequence: When firing a broadside salvo (three guns from the same turret), the firing order is: Left, Right, Center. During WWII, each gun fired 0.060 seconds apart, but later, the time was increased to 0.60 seconds for accuracy.

Broadside sideways movement: Contrary to popular myth, the ship *does not* move sideways when firing the main guns because the ship has too much mass. Blast pressure pushes out the water giving the illusion of sideways movement.

Turret crew: 77 in each turret, not including outer powder handlers

Backup fire control system: The large side hoods are the rangefinder (nicknamed “ears”). The uppermost small hoods on each side are the trainers’ telescopes and the two others the pointers’ telescopes. Each turret also has two periscopes.

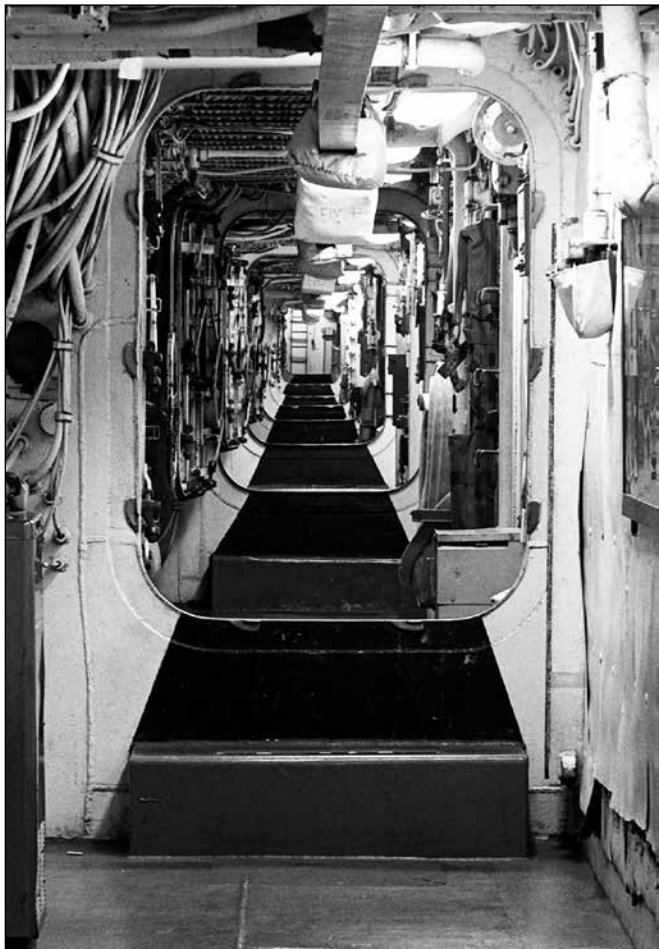
Number of projectiles per turret:

Turret 1: 390	Turret 2: 460	Turret 3: 370
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A total of 1,220 16-inch projectiles can be stored in the turret magazines:

Broadway: The 256 foot, center-line passageway on 3rd Deck from Frame 87 (aft of Turret 2) to Frame 151 (forward of Turret 3). Projectiles and powder canisters can be transferred from one magazine to another through nine watertight bulkheads via an overhead monorail system.

Broadway is the access to the four fire rooms, the four engine rooms, both 16-inch and 5-inch aft fire control plot rooms, and other auxiliary compartments. In WWII, it was known as the Third Deck passageway but gained the nickname of the famed New York street in the 1950s.



USS *Iowa* Broadway, Feb. 1, 1987

Notice eight watertight bulkheads and overhead monorail.

16-inch/50 Caliber Projectiles

Armor piercing: The 2,700 lb Mark 8 AP (Armor Piercing) 72" tall projectile. The AP shell with a muzzle velocity of 2,500 feet per second can penetrate ~30 feet of reinforced concrete or up to 18" of armor on enemy vessels depending on distance and angle of penetration.

High explosive: The 1,900 lb Mark 13 HC (High Capacity) 64" tall projectile for shore bombardment or soft targets. The HC shell has a muzzle velocity of 2,690 feet per second.

Nuclear: Mark 23 "Katie" nuclear projectile 64" tall and developed in 1955. Yield 15 to 20 kilotons and retired in 1961. The Navy never confirmed their presence on IOWA.

Other: Additional projectiles were available such as the "Firecracker" anti-personnel cluster round.

Powder: The 16-inch guns are "bag guns" meaning propellant charges are separate from the projectile. A full-charge powder bag is made of silk and weighs 110 lb. A normal charge is six bags per gun. Reduced charges were also available.

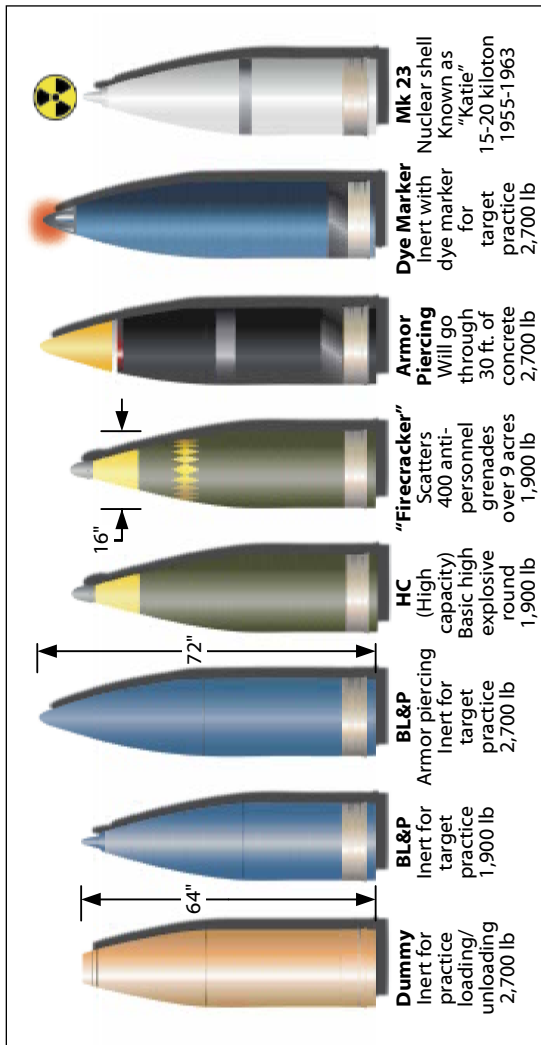
The propellant is smokeless powder diphenylamine (SPD). Because the hot gases eroded the barrels limiting life to ~290 rounds, the Navy in the late 1960s began using wear-reducing polyurethane jackets which increased barrel life to ~1,500 rounds.



USS *Iowa* off Korea, mid-1952



USS *Iowa* full broadside (9 – 16-inch and 6 – 5-inch) target exercise near Vieques Island, Puerto Rico; July 1, 1984



IOWA carried various projectiles, but "Katie" was never confirmed on IOWA. The projectiles are color coded. The gold and blue rounds are inert practice shells. The dye marker round was used to determine which rounds came from which battleship. IOWA's color was orange.

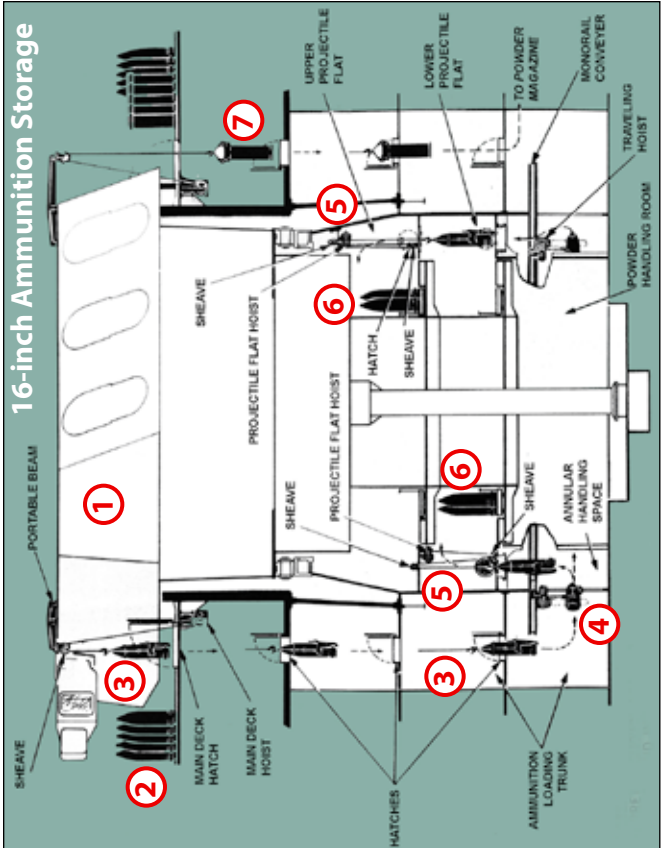
1. Turret rotated to align with hatch.
2. Projectile pallet positioned next to the turret.

Projectile:

3. Lowered to the transfer point.
4. Transferred through the armored door.
5. Hoisted up to either the lower or upper flat.
6. Stored in the inner or outer storage rings located on the lower and upper flats.

Powder tank:

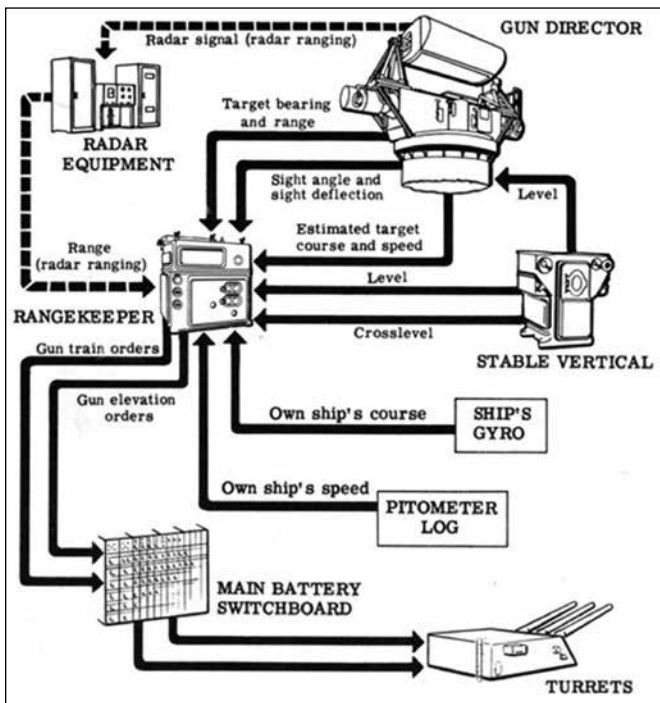
7. Contains three bags and is lowered for storage in the magazine.



Main Battery Fire Control

The purpose of fire control is to quickly acquire and hit a target accurately and consistently. IOWA's fire control systems are considered the finest and most sophisticated of their type ever developed.

The following diagram illustrates the main battery fire control process during WWII:



WWII main battery fire control system (16-inch guns)

Gun directors: The 16-inch main gun batteries are capable of using three gun directors designated Spot 1, Spot 2 and Spot 3. These directors provide range and bearing information for the analog computers to calculate firing solutions.

- **Spot 1:** The Mark 38 Director is a combination optical and Mark 13 radar rangefinders. The primary director (Spot 1) is located at the top of the forward fire control tower.
- **Spot 2:** A second director (Spot 2) located aft of the 2nd funnel is also a combination optical and Mark 13 radar rangefinders.
- **Spot 3:** The Mark 40 Director was mounted on top of the 05 Level armored conning tower.

Rangekeeper: First designed in 1936, the Ford Instrument Company Mark 8 Rangekeeper is an electromechanical analog computer that calculates the firing solution based on the gunnery data. This remarkable piece of equipment was used throughout IOWA's active duty.

Stable vertical: The Mark 41 Stable Vertical is a vertical seeking gyroscope. The Mark 41 continuously measures the angles between the deck and the horizontal plane so the Rangekeeper can keep the guns correctly elevated as the ship rolls and pitches. The gun firing keys (triggers) are mounted on this unit.

Ship's gyrocompass: Provides the ship's course.

Pitometer log: Measures the ship's speed.

Additional fire control data: To calculate an accurate firing solution, additional data is entered into the Mk 8 Rangekeeper:

- Relative wind speed and direction
- Average initial velocity of the projectiles
- Air density
- Corrections for gravity, wind, Magnus effect (flight path change due to projectile spin), earth's curvature and Coriolis effect (rotational movement of the Earth)
- Parallax correction

Plot rooms: These rooms contain most of the hardware needed to aim the guns and accurately put rounds on target.

Forward main battery plot room: Located just aft of Turret 2 barbette on 4th Deck and inside the citadel. The plotting room contains a Mark 8 Rangekeeper, Mark 41 Stable Vertical, Mark 13 Fire Control Radar controls and displays, and all additional equipment required to fire the guns. Range and bearing information can come from Spot 1, Spot 2 or Spot 3. During Korea, a Mk 48 analog computer was added.

Aft main battery plot room: Located on 3rd Deck forward of Turret 3 and just off Broadway. Aft plot is a clone of forward main battery plot and also uses Spot 1, Spot 2 or Spot 3.

Other plot rooms: Besides the two main battery (16-inch guns) plot rooms, IOWA has two other

plot rooms. Forward and aft secondary battery plots are used to aim and fire the 5-inch guns.



Mk 37 aft secondary battery director (Sky 4) and Mk 38 aft main battery director (Spot 2)



Forward main battery plot room (16-inch guns)

Who fires the 16-inch guns?: Redundancy is a key characteristic of the USS *Iowa* fire control design. IOWA's guns can be fired remotely (the preferred method) or under local control. The discussion up to this point has been about remote control of the guns.

Location	Equipment
Either forward or aft main battery plot (16-inch guns remotely controlled)	A Mk 8 Rangekeeper, Mk 41 Stable Vertical along with the required support equipment all located in the plot room using Spots 1, 2 or 3. The firing keys are mounted on the Mk 41 Stable Vertical.
Individual turrets (16-inch guns locally controlled)	Each turret can aim and fire their 16-inch guns independently using the stereoscopic rangefinder (the "ears") located at the rear of the turret and the pointing and training stations located on either side of the turret. <i>Note: Turret 1 rangefinder was removed during the 2nd commissioning, 1951.</i>

Firing the Main Battery

Firing sequence:

1. **Barrel:** Lowered to +5° angle for loading.
2. **Projectile:** (1900 lb HC or 2700 lb AP) from the projectile handling floor is loaded vertically onto the projectile hoist and brought up to the turret. The projectile is laid horizontally on the spanning tray and rammed into the bore.
3. **Powder bags:** Six 110 lb powder bags in groups of 3 are brought up the powder hoist from the powder handling room, pulled onto the spanning tray and rammed into the bore.
4. **Spanning tray:** Pulled up and away.
5. **Breech:** Pulled up and screwed closed.
6. **Primer (FFG black power):** A plug-like brass cartridge the size of a .30 cal. M-1 carbine shell is hand inserted into the firing lock. The primer is fired electrically or by percussion.
7. **Barrel:** Raised to its calculated firing position.
8. **Gun:** Fired
9. **Compressed air:** Blasted through the barrel to blow out any remaining hot embers.

Each gun can load and fire independently approximately every 30 seconds.

5-inch Secondary Battery

Secondary battery: 5-inch 38 caliber Mk 12 gun.



Dual purpose 5-inch twin enclosed mounts.

Extremely robust, versatile and considered “the gun that won the Pacific.” Carried on almost every US warship from WWII to the end of the Cold War.

Navy caliber: A ratio between the bore diameter and bore length (rifled portion of the barrel). The 5-inch x 38 calibers = 190” (15.8 feet), the rifled bore length.

Gun layout: Mk 28 Mod 2 twin enclosed mount, not turret. The original design was 10 twin mounts (20 guns), but the number was reduced to six twin mounts (12 guns) during the 1980s.

Gun crew: 27 in the mount and upper handling room plus personnel in the magazine.

Gun elevation: Both guns raise and lower together from -15° to $+85^{\circ}$.

Rate of fire: 15 rounds per minute but could surge up to 21 depending on the level of crew training.

Dual purpose (DP): Surface action and anti-aircraft

Effective range: 10 miles surface,
7 miles (37,000 feet) altitude anti-aircraft

Gun barrel recoil: 15"

Ammunition: Semi-fixed meaning the 55 lb projectile is separate from the 28 lb brass or steel alloy powder case. Each mount magazine held 595 projectiles and 595 powder cannisters.

Gun directors: The Mk 37 Gun Fire Control System (GFCS) is the primary control system and consists of optical and radar rangefinders. The unit provides range, bearing and elevation data to the plot rooms.

This unit has to track both ground targets and aircraft so the technology used is somewhat different from the main battery directors.



Forward Mk 37 gun fire control director (Sky 1)

Mk 37 GFCS system locations: IOWA has four GFCS systems.

Name	Location
Sky 1	Forward Mk 37 director located 06 Level just forward of Spot 1.
Sky 2	Port Mk 37 director located 06 Level next to the 1 st funnel.
Sky 3	Starboard Mk 37 director located 06 Level next to the 1 st funnel.
Sky 4	Aft Mk 37 director located 06 Level just aft of Spot 2.

Mk 1A computer: This computer performs the same function as the main battery Mk 8 Rangekeeper by calculating a firing solution. It differs somewhat from the Rangekeeper because the nature of the targets are different. Mk 1A had to deal with fast-moving aircraft. Both plot rooms have two computers.

Mk 6 Stable Element: Similar to the main battery Mk 41 Stable Vertical. It provides a stable reference point for aiming the 5-inch guns. Both plot rooms have two stable elements.

Forward and aft plot rooms: Forward secondary battery plot is adjacent to forward main battery plot located on 4th Deck. Aft secondary battery plot is adjacent to aft main battery plot located on 3rd Deck at the aft end of Broadway.



Forward secondary battery plot room (5-inch guns)

Who fires the 5-inch guns?: The guns are usually fired remotely but can be fired locally.

Location	Equipment
Either forward or aft secondary battery plot (5-inch guns remotely controlled)	A Mk IA Fire Control Computer, Mk 6 Stable Element along with the required support equipment all located in the plot room using Sky 1, 2, 3 or 4. The firing triggers are mounted on the Mk 6 Stable Element.
Individual mounts (5-inch guns locally controlled)	Each mount can aim and fire their 5-inch guns independently using the stereoscopic rangefinder located at the rear of the mount and the pointing and training stations located on either side of the mount.

Anti-Aircraft Guns (1945)

40 mm/56 cal. Bofors anti-aircraft guns: IOWA had 19 quad mount (76 barrels) Bofors 40 mm guns. Her three sister ships had one additional 40 mm quad atop Turret 2. Since IOWA was a fleet flagship with an extra bridge level (03 Level) to accommodate an admiral, a quad 40 mm on Turret 2 would have impaired visibility.

Rate of fire : Up to 160 rounds per barrel per minute.

Projectile weight: 2 lb

Elevation: -15° to $+90^{\circ}$

Effective AA ceiling: ~22,000 feet



USS *Iowa* quad mount 40 mm Bofors, 1944
USS *New Jersey* (BB-62) in background



USS *Iowa* 20 mm Oerlikon, 1943

20 mm/70 cal. Oerlikon AA guns: IOWA had 52 Oerlikons, but during the later years of WWII, this weapon became less effective especially against Kamikaze attacks. All were removed most likely prior to the 1949 decommissioning.

Rate of fire: Up to 450 rounds per minute.

Projectile weight: ~0.25 lb

Elevation: -15° to +90°

Effective range: Against low-flying aircraft
~0.6 miles or 1,000 yards

Maximum range at 45°: ~2.7 miles

Offensive Systems (1980s)

BGM-109 Tomahawk: 32 cruise missiles carried in eight Armored Box Launcher (ABLs), four aft and four amidships. The ABLs are raised to their firing position, and the Tomahawks launched initially using a solid-propellant rocket booster until the turbofan jet engine takes over.

Missile configurations: Anti-ship (TASM), land-attack (TLAM-C) conventional and land-attack nuclear (TLAM-N).

Range: Between 250 and 1,500 miles depending on the configuration.

Original ABL launchers: Four original ABLs are on the after missile deck.

Replacement ABLs: While IOWA was in the reserve fleet, the Navy removed the four amidships ABLs for use on other warships. PBC constructed four model replacements.

RGM-84 Harpoon: 16 radar guided anti-ship missiles carried in four quadruple Mk 142 launchers located on the port and starboard sides of the 2nd funnel. Giving IOWA over-the-horizon strike capability, Harpoons use a solid-propellant rocket booster for the initial launch after which the turbofan jet engine takes over.

Range: 75 miles

Original launchers: Removed by the Navy. PBC constructed model replacements.

Defensive Systems (1980s)

20 mm Phalanx CIWS: Four Close-In Weapon System, a six-barrel Gatling-type guns. Often pronounced "sea whiz."

Bullets: Depleted uranium

Rate of fire: 3,000 rounds per minute

Gun locker: 1,000 round magazines

Range: 1.1 miles or 2,000 yards

Fire control: Closed-loop radar system capable of tracking its own bullets to the target. Nicknamed "R2D2" because the white dome resembles the *Star Wars* droid.

Original CIWS: All four removed by the Navy. PBC constructed model replacements.

SRBOC: 24 Super Rapid Blooming Offboard Countermeasures chaff and decoy launchers 05 Level port side and another 24 on starboard. A typical round is rocket launched to an altitude of ~1,300 feet, 0.9 miles from the ship, where decoy devices such as flares or aluminum foil are deployed.

Missile defense: SLQ-32 electronic warfare system on 011 Level, port and starboard. These units try to jam or confuse incoming missiles. The SLQ-32 system is tied into both CIWS and SRBOC.

FIM-92 Stinger: Shoulder-fired, short-range anti-aircraft missile. IOWA had five firing positions with stored weapons and ready service rounds.

Propulsion

IOWA has four shafts driving four propellers (screws). The machinery space is divided into eight compartments designed to contain and minimize the effects of battle damage. These compartments, accessible from Broadway, are arranged sequentially beginning at Frame 87 (fwd. of the wardroom) and ending at Frame 151 (fwd. of Turret 3).

Name	Frames	Function
Fire Room No. 1	87-95	Provides steam for Engine Room No. 1
Engine Room No. 1	95-103	Drives the starboard outboard shaft (Shaft #1)
Fire Room No. 2	103-111	Provides steam for Engine Room No. 2
Engine Room No. 2	111-119	Drives the port outboard shaft (Shaft #4)
Fire Room No. 3	119-127	Provides steam for Engine Room No. 3
Engine Room No. 3	127-135	Drives the starboard inboard shaft (Shaft #2)
Fire Room No. 4	135-143	Provides steam for Engine Room No. 4
Engine Room No. 4	143-151	Drives the port inboard shaft (Shaft #3)

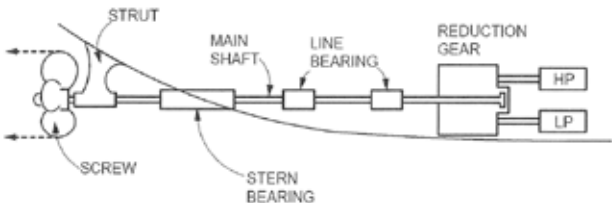
Fire rooms: The ship has four fire rooms and eight boilers. Each room has two oil-fired 600 psi Babcock & Wilcox M-type water tube boilers supplying 850° F superheated steam to one engine.

Boiler: Fire Room No. 3 starboard boiler with the firebox cover removed.



Boiler

Engine rooms: The ship has four engine rooms each with one General Electric steam turbine engine connected to a propeller shaft through a double reduction gear. The reduction gear reduces high turbine speed to low propeller speed.



Engine: An engine consists of two turbine assemblies, high pressure (HP) and low pressure (LP).



Low Pressure (LP) Turbine

A set of smaller turbine blades of opposite pitch are attached to each end of the LP turbine assembly to provide astern propulsion.

Reduction gear: The double reduction gear produces 53,000 shaft horsepower (SHP) at 202 rpm when the HP turbine rotates at 4,905 rpm and the LP turbine at 3,195 rpm.



Double Reduction Gear (Side View)

Reduction gear: Front of the Engine Room No. 4 double reduction gear looking aft. The low-pressure (LP) turbine is in the left foreground with the high-pressure (HP) turbine to the right.



Double Reduction Gear (Front View)

Shaft: Each shaft is a series of 23" diameter, 4.25" thick, hollow sections bolted together and supported by multiple bearings of different types. One end of the shaft



Shaft and Line Bearing

is connected to the double reduction gear and the other to the propeller or screw.

Electrical generation: Two turbo-generators in each engine room generate 450 volt (per name-plate), 3-phase, 60 Hz AC power for the ship's 440\110 VAC electrical needs.



Electrical Generator

Each engine room has an electrical panel for controlling and monitoring the two generators.



Electrical Control Panel

Installed power: 212,000 shaft horsepower (SHP) total from four engines. Each engine supplies 24,400 SHP from the high-pressure (HP) turbine and 28,600 SHP from the low-pressure (LP) turbine for a total of 53,000 SHP per engine room.

Design speed: 33 knots (38 mph)

Maximum reverse speed: 17.5 knots (20 mph)

Propellers (screws): Four propellers (screws) driven by four separate shafts each 23" in diameter:

Shaft	Location	Propeller (Screw)	Shaft Length
#1	Starboard outboard	18' 8" diameter, 4 blades, 43,300 lb*	340 feet from E. R. No. 1
#2	Starboard inboard	17' diameter, 5 blades, 42,976 lb	243 feet from E. R. No. 3
#3	Port inboard	17' diameter, 5 blades, 43,260 lb	179 feet from E. R. No. 4
#4	Port outboard	18' 3" diameter, 4 blades, 44,730 lb	277 feet from E. R. No. 2

Note: E. R. = Engine Room. *This propeller was originally for a Midway-class aircraft carrier.

Shaft rotation: Port counterclockwise, starboard clockwise. Inboard screws rotate 2-10 rpm faster.

Shaft revolutions: 219 rpm for 31 knots per the 04 Level Lee Helm plaque.

Range: 15,000 miles at 15 knots (17 mph)

Fuel capacity (1945): ~2.4 million gallons

Fuel: Heavy fuel oil but converted to Navy Standard Distillate fuel in the 1980s

Estimated fuel usage*:

- At 14.8 knots (17.0 mph), 161 gallons per mile or 32.8 feet per gallon
- At 30.0 knots (34.4 mph), 476 gallons per mile or 11.1 feet per gallon

**War Service Fuel Consumption of US Naval Surface Vessels*

Evaporating units: One 20,000 gallons per day (gpd) and two 40,000 gpd distillers produce 100,000 gallons of fresh water a day for the boilers and crew.

Lee Helm: Located next to the helm (ship steering) on both 04 and 08 Levels. The Lee Helm consists of two instruments both which send information to all four engine rooms. The Engine Order Telegraph is for ordering forward and aft speed ranges and the Engine Revolution Indicator for specific shaft revolutions.

Steering

Rudders: Twin rudders 21 feet tall. The rudder steering gear is protected by a 13.5" Class A armored compartment.

Helm: Turning the ship's wheel generates electrical signals that are sent to two hydraulic ram steering engines located near the stern on 4th Deck. The steering engines move the rudders:

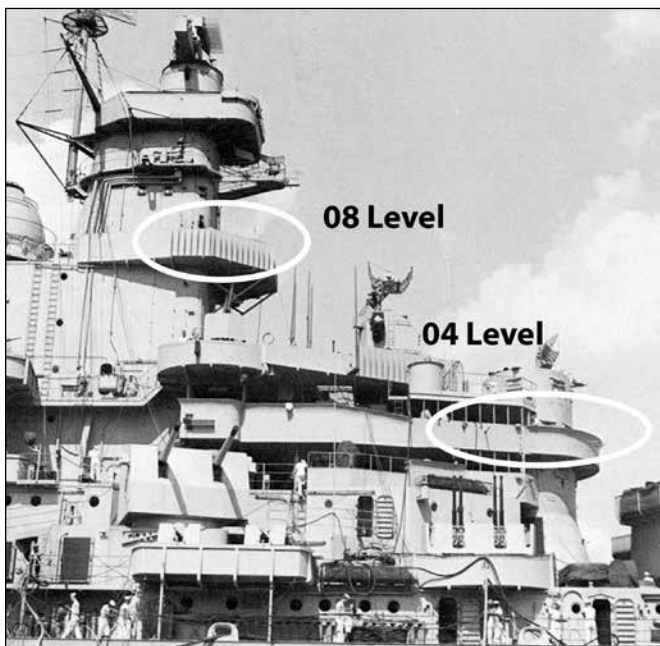
1. Primary helm is on the navigation bridge 04 Level inside the armored conning tower.
2. Secondary helm is on 08 Level of the main battery fire control tower.

After steering: There are two after-steering stations located next to the hydraulic ram engines on 4th Deck. The rudders can be controlled from these positions and as a last resort, manually with block, tackle and muscle.

Manoeuvrability: IOWA-class battleships are extremely maneuverable at speed. They could turn faster and quicker than a WWII Fletcher-class destroyer.

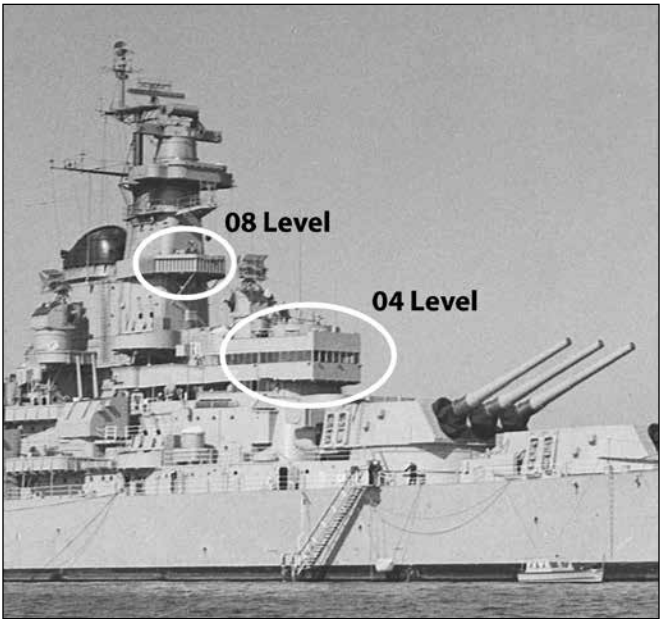
Navigation Bridges

The primary navigation bridge is located on 04 Level. IOWA was originally built with an exposed armored conning tower and open bridge which proved unsatisfactory.



USS *Iowa*, Nov. 1943, with an exposed armored conning tower and open bridge

When IOWA was refurbished between Jan. 15 and Mar. 19, 1945, the bridge was enclosed to its current configuration.



USS Iowa 1948-49 with enclosed bridge

The secondary navigation bridge is located on 08 Level affording a better view but not much protection.

Each bridge has a helm for steering and a lee helm for communicating with the engine rooms. Another navigation position is the open bridge on the 05 Level forward of the gunnery officer's armored conning tower station and just above the 04 Level enclosed bridge.

Admiral's Bridge

Located on 03 Level directly below the 04 Level navigation bridge. IOWA was a fleet ship meaning the fleet commander, an admiral, required quarters for himself and his staff to direct the fleet.

The armored conning tower has three levels as part of the original design: 05 Level for the gunnery officer, 04 Level for the captain and 03 Level for the admiral. Of the four IOWA-class ships, only IOWA's conning tower 03 Level is armored.



USS *Iowa*, Nov. 1943

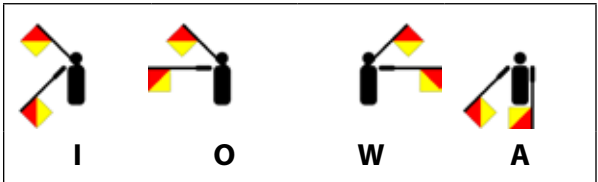
Signal Bridge

Located on 03 Level aft of the admiral's bridge and armored conning tower. During IOWA's career, ships communicated four ways:

1. Radio including satellite communications which became the standard method using the QE-8L satellite communication antennae (011 Level and on the 2nd funnel aft) and the discone/discage antenna array located on the bow.
2. Signal lamp transmitting Morse code using either visible light or infra-red.
3. Semaphore flags:



Navy seaman sending Morse code









4. Signal flags (see next page):

Signal Flags

The Navy uses international alphabet flags, numeral flags, numeral pennants, special flags and pennants for visual signaling. The signal flags can spell words or when used as a single hoist, have a very specific meaning.

Today, flags are messages to guests or denote the ship's radio call sign. Pennants are used to display some of IOWA's commendations and awards.


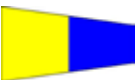




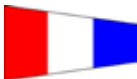



Flag	Name	Navy Single-Flag Usage Meaning
	A Alfa	I have a diver down; keep well clear at slow speed.
	B Bravo	I am taking in, discharging, or carrying dangerous cargo.
	C Charlie	Yes or affirmative.
	D Delta	I am maneuvering with difficulty; keep clear.
	E Echo	I am directing my course to starboard.
	F Foxtrot	I am disabled; communicate with me.

Flag	Name	Navy Single-Flag Usage Meaning
	G Golf	I require a pilot.
	H Hotel	I have a pilot on board.
	I India	Coming alongside.
	J Juliet	I am on fire and have dangerous cargo; keep clear.
	K Kilo	I wish to communicate with you.
	L Lima	You should stop your vessel immediately.
	M Mike	My vessel is stopped; making no way.
	N November	No or negative.
	O Oscar	Man overboard.
	P Papa	All personnel return to ship; proceeding to sea (In port).



Flag	Name	Navy Single-Flag Usage Meaning
	Q Quebec	Boat recall; all boats return to ship.
	R Romeo	Preparing to replenish (at sea). Ready duty ship (in port).
	S Sierra	Conducting flag hoist drill.
	T Tango	Do not pass ahead of me.
	U Uniform	You are running into danger.
	V Victor	I require assistance.
	W Whiskey	I require medical assistance.
	X Xray	Stop carrying out your intentions and watch for my signals.
	Y Yankee	Ship has visual communications duty.
	Z Zulu	I require a tug.

Pennants

Numbers are usually designated by pennants.

Pennant	Name	Pennant	Name
	0 Number 0		5 Number 5
	1 Number 1		6 Number 6
	2 Number 2		7 Number 7
	3 Number 3		8 Number 8
	4 Number 4		9 Number 9

IOWA hoisted pennants:

Pennant	Meaning
	Meritorious Unit Commendation
	Battle Efficiency E award

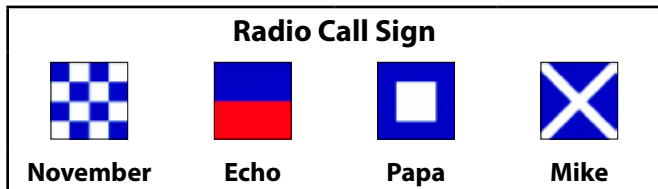
Radio Call Sign

“November - Echo - Papa - Mike” is the USS *Iowa* radio call sign. The call sign is painted on both the port and starboard sides of the superstructure at the 03 Level flag bridge. On occasion, the call sign is displayed with hoisted signal flags.

The call sign as displayed with hoisted flags:



The call sign as painted on the superstructure:



Ground Tackle

Anchors: Two 30,000 lb anchors each with 29 links and a swivel attached to 12 shots of chain (1 shot = 90 feet, 79 links per shot). Each anchor chain ~990 links (128 lb per link) and ~1,130 feet long.

IOWA Ground Tackle



Standard Navy stockless anchor



Anchor chain with chain stopper and pelican hook

IOWA Ground Tackle



Wildcat on anchor windlass





Capstan, wildcat and spurling pipe or "turtle-back" (black pipe anchor chain is going into)



Port outer wheel is the port capstan/wildcat speed control. The port inner wheel is the brake. Same arrangement on starboard

Deck Fittings

Each piece of equipment has a function.

IOWA Deck Fittings
 <p data-bbox="505 614 578 651">Bitts</p>
 <p data-bbox="505 1098 578 1134">Bitts</p>

IOWA Deck Fittings



Closed chock



Roller chock



Tie down or "pad eye" (on the fantail)

IOWA Deck Fittings



Bollards



Cleats



Cleat

Boat Davits

IOWA carried various boats over the years to transport the crew to and from the ship when not docked at a pier. The current configuration dates to the 1980s with each davit consisting of two arms connected by a strongback. The port boat davit held a 40-foot utility boat (UB) with a 26-foot whale boat stored above it. The starboard davit held a 33-foot officer's motor barge (OMB) with a 26-foot whale boat stored above it. A captain's gig and an admiral's barge are highly decorated OMBs.

Two 40-foot utility boats and the 33-foot captain's gig, all on dollies, were near Turret 3 on the port side of Main Deck. These boats were launched using the large boom attached to the port side of the aft superstructure.



Starboard boat davit with an officer's motor barge (OMB)

The boom has a lifting capacity of 10 tons. It utilizes three winches, two on Main Deck and the gypsy winch on 02 Level.

UNREP System

The large outrigger (kingpost) on the starboard side next to the aft superstructure is part of the Underway Replenishment (UNREP) equipment. It was added in the 1980s.

The Navy uses two types of UNREP, Vertical replenishment (VERTREP) and alongside connected replenishment (CONREP).

With CONREP, two or more ships steam side-by-side and the hoses and lines used to transfer fuel, munitions, supplies, and personnel connect the ships. This method is called **STREAM** or **Standard Tension REplenishment Alongside Method**.

IOWA carried large quantities of fuel and often was used in a support role to refuel other ships. The refueling kingpost supported IOWA's highlines which bore the weight of the fuel-transfer hoses.



Refueling kingpost

Life Aboard

Welcome aboard!

Navy terms

Navy Terms	
Abeam: <i>90° or 270° relative to the ship</i>	Hatch: <i>Opening between decks</i>
Aft: <i>Toward the back of the ship/Fantail/Stern</i>	Head: <i>Bathroom</i>
Amidships: <i>Toward the middle of the ship</i>	Ladder: <i>Stair</i>
Below: <i>Below the speaker's reference point</i>	Level: <i>Decks above Main Deck</i>
Berthing: <i>Sleeping area</i>	Line: <i>Rope</i>
Brow: <i>Ramp from the dock to the ship</i>	Mess: <i>Eating area</i>
Bulkhead: <i>Wall</i>	Overhead: <i>Ceiling</i>
Bunk: <i>Officer's bed</i>	Port: <i>Left side of the ship looking forward, color Red</i>
Compartment: <i>Room</i>	Port hole: <i>Window</i>
Deck: <i>Floor</i>	Rack: <i>Enlisted bed</i>
Door: <i>An opening in a bulkhead</i>	Rope: <i>Ships have only one rope. It hangs on the ship's bell. All the rest are lines</i>
Draft: <i>Hull depth between water line and keel</i>	Scullery: <i>Dish washing area</i>
Forward: <i>Toward the front of the ship/Bow/Forecastle</i>	Scupper: <i>Drain</i>
Freeboard: <i>Hull height between the water line and Main Deck</i>	Scuttle: <i>Small round opening in a hatch or bulkhead, usually for emergency exit</i>
Galley: <i>Cooking area</i>	Starboard: <i>Right side of the ship looking forward, color Green</i>
	Topside: <i>Any exposed deck</i>

Doors are vertical. Hatches are horizontal.

“Bull’s eyes”

How did sailors find their way around the ship without getting lost? Each compartment on IOWA has an “address” called a bull’s eye painted on the bulkhead.

Different bull’s eyes were used from the 1940s to the mid-1980s but were updated to the current standard when the ship was decommissioned.

1-119-6-Q
FR 119-127
X-2

Note: *The ship has 217 hull frames spaced four feet apart and numbered sequentially starting at Frame 0 near the bow.*

1-119-6-Q		
1	Level or deck	This compartment is on Main Deck
-	Called a “tack”	
119	The furthest forward frame in the compartment	Frame 119
6	Location of the compartment relative to the center line of the ship. Even numbers to port, odd numbers to starboard	No. 6 = 3 rd compartment outboard from the center line to port
Q	Compartment use	Miscellaneous

FR 119-127 and X-2 mean X-2 Division is responsible for cleaning and maintaining the compartment from Frames 119 to 127.

Material Condition of Readiness

The letters X, Y, or Z painted on many of the ship's fittings, doors and hatches indicate how an opening should be configured (open or closed) depending on the degree of material condition of readiness. The three condition representing different levels of tightness and protection are XRAY, YOKE and ZEBRA.

Condition XRAY provides the least amount of protection but the greatest ease of access throughout the ship. It is set when:

- In port during regular working hours
- No danger of attack or bad weather

Condition YOKE provides more protection than condition XRAY. It is set when:

- In port outside of regular working hours
- At sea during peacetime
- In port during wartime

Condition ZEBRA provides the maximum amount of protection. It is set when:

- Before the ship leaves or enters port during wartime
- Immediately, without further orders, when the ship is at general quarters
- To isolate and control fires and flooding when the ship is not at general quarters

Enlisted Berthing Areas

The largest ship's enlisted complement was in WWII with 2,527 sailors and 110 Marines who slept in racks stacked three, four and five high. The racks are distributed all over the ship but are concentrated in the following areas:

- Main Deck port and starboard sides aft of the wardroom.
- 2nd Deck forward - 400+ racks
- 2nd Deck amidships port and starboard
- 3rd Deck forward - 200+ racks
- 3rd Deck aft - 400+ racks



Main Deck port side enlisted berthing three high (1980s)

Captain's In-Port Cabin

Located 01 Level starboard side aft of Turret 2. The cabin consists of three compartments: Stateroom, berthing area and head.

President Franklin D. Roosevelt used this cabin when transported to and from the Tehran Conference in 1943. Some of the D-Day invasion planning took place while Roosevelt was on board using an earlier version of the conference table located in the stateroom.

IOWA's in-port cabin is unique because as an adult, President Roosevelt had contracted polio and was partially paralyzed. Since he could not use a shower, a bathtub was installed in the head.

Captain's Sea Cabins

One is located 04 Level aft starboard side of the chart house which is located directly aft of the armored conning tower. The captain would use this cabin when the ship was at sea. It is small and austere with a desk, bed and head. Another sea cabin is on 08 Level.

Chief Petty Officer (CPO) Quarters

Located 2nd Deck aft of the crew mess at the stern of the ship. The CPO quarters contains berthing, a lounge, CPO mess and a galley. Meals were prepared and served by enlisted men.

Crew Mess

Located 2nd Deck forward of the CPO quarters and aft of Turret 3. One of the crew berthing areas is below the crew mess area.

Wardroom

Located aft of Turret 2 on Main Deck below the captain's in-port cabin. The wardroom was the officers' dining and recreation area. Formal sit-down meals were served by stewards, and officers customarily sat in order of seniority. Recreation included games, movies and music.

The wardroom lounge was equipped as an emergency surgery and triage area. The large metal device on the starboard aft bulkhead is an autoclave for sterilizing medical equipment. Operating table lights are mounted overhead. Besides the surgical area, the wardroom tables could be used as examination tables.

Junior Officer Staterooms

Located 01 Level port and starboard aft of the captain's in-port cabin. The two port and starboard passageways are each 50 frames or 200 feet long, the second longest passageways on the ship. Broadway is the longest at 64 frames or 256 feet.

Senior Officer Staterooms

Located Main Deck just forward of the wardroom and aft of Turret 2 barbette, in an area sometimes called the “horseshoe.”



Senior officer's stateroom
(Commander)

Quarterdeck

The quarterdeck is not a specific deck but a ceremonial area designated by the captain. In port, the quarterdeck is the most important place on the ship and the central point for all major activities.

Larger Navy ships usually have a forward brow for officers and an aft brow for enlisted to egress and ingress the ship while in port. Nevertheless, there is only one formal quarterdeck.

Quarterdeck on an active duty ship...

In port, the Officer of the Deck (OOD) shifts the watch from the bridge to the quarterdeck. Although not underway, the OOD must be vigilant about the safety of the ship, checking mooring lines or anchor chains as appropriate, monitoring weather conditions for significant changes and controlling access to the ship. The OOD and the watch team supervise and carry out the ship's routine, conduct honors and ceremonies as appropriate, control the ship's 1MC system, conduct drills, and carry out additional orders from the captain, executive officer or the command duty officer.

- *Bluejacket's Manual, USN*

In the 1980s, IOWA's formal quarterdeck was at the top of the forward brow but known informally by the crew as the forward quarterdeck. The top of the aft brow was referred to as the aft quarterdeck.

Today, the forward quarterdeck is the primary welcoming area for visitors and the location of Security Dispatch. The aft quarterdeck (aft brow) is the visitor's exit and where crew should board and depart the ship.

Jack of the United States

The jack is a maritime flag representing the United States Navy and is flown on the jackstaff located on the bow of the ship.

Prior to 2002, the Navy flew the United States Union Jack with the blue background and a star for each state.



United States Union Jack



First Navy Jack

In 2002, the Secretary of the Navy authorized the First Navy Jack, inscribed with “Don’t Tread on Me,” be flown from all naval vessels as recognition of the global war on terrorism. The jack is flown only when the ship is made fast, anchored or alongside.



Jack on the bow

National Ensign

When the ship is anchored or moored, the national ensign is flown on the flagstaff located on the ship's stern. When the ship is underway, it is flown from the main mast.

Morning and Evening Colors

When a Navy ship is not underway, the national ensign is ceremoniously raised on the flagstaff at 0800 accompanied by the playing of the national anthem or the bugle call "To the Colors."

At sunset, the national ensign is lowered accompanied by the playing of the bugle call "Retreat."

In both morning and evening colors, all topside personnel come to attention and render a salute. Simultaneously, the jack is either raised or lowered.



National ensign on the stern

Reporting Aboard an Active Duty Ship

Some ships have one brow while others two, one for officers and one for crew. The following example is for a one-brow active duty Navy ship:

Time	In Uniform?	Procedure
0800 to sunset	Yes	Stop at the top of the brow, face aft toward the national ensign and salute. Proceed to the quarterdeck.
0800 to sunset	No	Stop at the top of the brow, face aft toward the stern, come to attention but do not salute. Proceed to the quarterdeck.
Sunset to 0800	Yes or No	Proceed to the quarterdeck.

Upon reaching the quarterdeck, salute if in uniform, and say "request permission to come aboard, sir." The person manning the watch may or may not be an officer. Nevertheless, call him or her "sir" as they represent the authority of the ship's commanding officer. Hold the salute until receiving permission to board.

1MC

1 Main Circuit (1MC) is the public address system used aboard Navy ships. Control stations for the 1MC system are located at the pilot house, officer of the deck (OOD) stations on the quarterdecks, after steering and damage control central.

General Quarters

The purpose of general quarters is to prepare the ship to fight, both offensive and defensive operations, as quickly as possible.

The condition of readiness required for a ship to go into combat is **Condition ZEBRA**. This means all watertight compartments are “buttoned up” to insure integrity and prevent the spread of fires. It is imperative all personnel get to their GQ stations before the doors and hatches are slammed shut.

During GQ, personnel traffic flow is very important and is generally “up and forward on the starboard side - down and aft on the port side.” Travel against the flow of traffic is dangerous and should be avoided.

Ship's Time/Watches

Traditionally, a 24-hour day is divided into seven watches four hours long except the dog watches:

Watch	Time
Mid	0000-0400 (<i>midnight to 4 a.m.</i>)
Morning	0400-0800 (<i>4 to 8 a.m.</i>)
Forenoon	0800-1200 (<i>8 a.m. to noon</i>)
Afternoon	1200-1600 (<i>noon to 4 p.m.</i>)
First Dog	1600-1800 (<i>4 to 6 p.m.</i>)
Second Dog	1800-2000 (<i>6 to 8 p.m.</i>)
First	2000-2400 (<i>8 p.m. to midnight</i>)

The dog watch is split into two half-watches, first dog and second dog, each lasting two hours. This alternates the daily watch routine so sailors on mid watch will not have it the second night and also allows the watchstander to eat the evening meal.

The half hours of the watch are marked by striking the bell an appropriate number of times. The end of the watch is eight bells giving rise to the phrase, "Eight bells and all is well."

For example, the morning watch ends at 0800 with eight bells which begins the forenoon watch. The the bell sequence is as follows:

Forenoon Watch	Afternoon Watch
0830 - 1 bell	1230 - 1 bell
0900 - 2 bells	1300 - 2 bells
0930 - 3 bells	1330 - 3 bells
1000 - 4 bells	1400 - 4 bells
1030 - 5 bells	1430 - 5 bells
1100 - 6 bells	1500 - 6 bells
1130 - 7 bells	1530 - 7 bells
1200 - 8 bells	1600 - 8 bells

In the days of sail, the bell was rung every half hour because sailors had no way to tell time. Today, the bells typically start at 0800 and end at 2200.



US Navy recruiting poster, 1917
Howard Chandler Christy (artist) : 1873-1952

Excerpt from the USS *Iowa* Crew Orientation Handout (1945)

In the *Iowa*, there live over 2,500 men who enjoy many of the conveniences of any town of similar population. 2,500 men consume 7 tons of food per day costing \$1,600, [*\$21,059 in 2016 dollars*]. Of the seven tons, 1 ½ tons are of fresh foods, 2 tons of frozen and 3 ½ tons of dry. In the huge storerooms, 100 tons of fresh fruit and vegetables can be stored, 84 tons of frozen meats, 650 tons of dry stores, totaling 834 tons of food, sufficient to last 119 days. In addition, the soda fountain produces 9,600 gallons of ice cream each month.

In the modern laundry, 540,000 pounds of clothes are laundered, 3,600 officer's and chief's uniforms are laundered and pressed, and 12,000 pounds of linen washed every month. In the 8 chair barber shop, the barbers turn out 7,400 haircuts per month, and in the cobbler shop, 650 pairs of heels are replaced and 250 pairs of soles, monthly.

Holidays mean an extra special dinner for all hands. The Fourth of July Menu in 1945 cost \$1.05 [*\$13.82 in 2016 dollars*] per man. . . .

Victory the Mascot

Mascot First Class Victory was the official mascot of USS *Iowa* during WWII. Vicky, a male, was the pet of Captain, later Admiral, John McCrae, IOWA's first commanding officer.



Victory the dog

Dog Mascot Goes A.W.O.L. Again

Search parties looked all over the Long Beach environs for the small brown and white canine named "Victory" or "Vicky/Vickie" for short, with no initial luck. The Times reported that Vicky had been with the Iowa since its commissioning, had substituted for President Roosevelt's dog Fala when the commander-in-chief went to the Tehran conference aboard the ship in 1943, and "was the first American dog in Japan" after the Japanese surrender. Vicky, who was said to have a "number of decorations on his white collar," had gone "absent without leave" before (in San Francisco & on an island in the Carolines), but had always returned before the Iowa left port.

The Iowa crew's calls for help from Long Beach and Los Angeles residents apparently worked. A report a couple of weeks later states that Vicky was aboard the ship in Long Beach Harbor playing with Times newspaper carriers who were visiting. It was also noted that Vicky's "201,778 mile voyage aboard the Iowa has earned him the reputation of the most-traveled dog in the Navy."

- Los Angeles Times, Nov. 29, 1945

Frequently Asked Questions/Answers

A. Ship History/Statistics:

- 1. When was the ship built?**
See "IOWA Chronology" page 12.
- 2. How long did it take to build IOWA?**
*Both USS Iowa and USS New Jersey, 32 months;
USS Wisconsin 36 months and
USS Missouri 41 months*
- 3. What did it cost?**
See "Cost" page 9.
- 4. When did the ship serve?**
See "USS Iowa active duty" page 9.
- 5. Was this ship at Pearl Harbor?**
*No. In 1941, she was under construction at the
New York Naval Ship Yard.*
- 6. What about the armor?**
See "Protection and Armor" page 24.
- 7. What type of fuel does the ship use?**
See "Fuel" page 60.
- 8. How much fuel can the ship carry?**
See "Mission" page 4.
- 9. What is the horsepower?**
*See "Each engine room has an electrical panel
for controlling and monitoring the two genera-
tors." page 96.*
- 10. How fast can this ship go?**
See "Design speed" page 59.

- 11. How many propellers does it have?**
See "Propellers (screws)" page 59.
- 12. How many rudders?**
See "Rudders" page 61.
- 13. How many served on board at one time?**
See "Complement" page 21.
- 14. Where did the enlisted men sleep?**
See "Enlisted Berthing Areas" page 81.
- 15. How many workers built IOWA?**
*"Over 2,000 men, covering 70 trades, were involved in building USS Iowa."
- The Iowan 3Q-2012*
- 16. Why are battleships named after states?**
See "Battleship naming" page 6.
- 17. What does BB mean? 61?**
See "Battleship hull designation" page 6.
- 18. Was IOWA in Vietnam? Gulf War? If not, were there other IOWA-class battleships involved?**
USS Iowa was not in any war after Korea. USS New Jersey served in Vietnam. USS Missouri and USS Wisconsin participated in the Gulf War.
- 19. How long would it take to re-commission the ship and would the Navy do it?**
Extremely unlikely the Navy would exercise this option. When the ship was recommissioned in 1984, the process took 2 years and cost \$635M.
- 20. Why was IOWA decommissioned?**
Battleships were too expensive to operate.

B. Turrets:

1. When will a turret be opened up?

*As soon as decontamination can be completed.
No date yet established.*

2. How do the turrets work?

See "16-inch Main Gun Battery" page 33.

3. Where are the guns fired from?

See "Who fires the 16-inch guns?" page 44.

4. What are the big "ears" on the side of Turrets 2 and 3? How come Turret 1 doesn't have them?

Backup optical range finders. Turret 1 originally had one. In rough seas, water would seep in and damage the optics so it was removed.

5. How far does a 16-inch shell go?

See "Range" page 33.

6. How are the guns aimed?

See "Main Battery Fire Control" page 40.

7. How many men to fire the guns?

See "Turret crew" page 34.

8. What does 16-inch, 50 caliber mean?

See "Navy caliber" page 33.

9. Does the ship move sideways during a broadside? If not, why not?

See "Broadside sideways movement" page 34.

10. Does the ship plan to shoot any of the guns?

PBC fires both a 40 mm salute gun on the port side 01 Level and a 5-inch gun.

11. Was this ship ever hit by enemy fire?

Yes. On Mar. 18, 1944, during the ship's shore bombardment of the enemy on Mili Atoll in the Marshall Islands, the ship was hit twice by Japanese shore battery shells on the port side. Once on Turret 2 leaving a mark still visible, and once 4 feet below Main Deck at Frame 134 tearing a 30" by 50" hole. In both cases, the damage was deemed minor.

12. What happened in 1989?

On Apr. 19, 1989, during gunnery practice near Puerto Rico, an open breech explosion occurred in the middle gun of Turret 2 killing 47 sailors.

Turret 2 is now a memorial to the dead sailors.

13. Would there be men on Main Deck when the 16-inch guns were being fired?

Very doubtful men were close to the guns. During WWII, there were two quad Bofors 40 mm anti-aircraft guns in front of Turret 1, but the concussion would have been deadly if the guns were fired over that position. Two Battleship IOWA tour guides served on USS New Jersey during Vietnam. One said sailors were on deck when the guns were fired but at the opposite end of the ship. The other, the ship's videographer, took movies while standing under the discone/

disage antenna when a broadside was fired. He said, "I will never do that again!"

14. What kind of bullets were used?

See "" page 35.

C. Decks:

1. Why are the decks wood?

See "Wooden decks" page 22.

2. When will the decks be replaced and with what material?

Teak deck replacement will cost ~\$7M. PBC is actively seeking funding.

D. Bridge:

1. How many men would be in the conning tower? Where's the captain?

10-12 men. After the armored conning tower was enclosed with current bridge, the captain sat on the chair, and when not on the bridge, he was in his sea cabin located in the aft starboard side of the chart house just behind the armored conning tower on 04 Level.

2. How can the helmsman see to steer the ship?

The helmsman only needs to see the gyrocompass in front of him to steer the heading ordered by the conning officer who receives orders from the captain and/or the officer of the deck.

E. Captain's Cabin:

- 1. How long did President Roosevelt spend on the ship? Dates?**

15 days. FDR boarded Nov. 12, 1943 and disembarked at Mers el Kebir landing, Oran, Algeria, on Nov. 20, 1943, to attend the Tehran Conference to meet with Churchill and Stalin.

FDR transferred back aboard from the Free French warship Gazelle on Dec. 9, 1943, and left IOWA Dec. 16, 1943, on returning to the U.S.

When IOWA returned, she had steamed 16,161 miles at an average speed of 22.5 knots (26 mph) - a speed so great that the destroyers sent to screen her had to be sent in relays.

F. Missiles:

- 1. What's the difference between Tomahawk and Harpoon missiles?**

See "Offensive Systems (1980s)" page 52.

G. Miscellaneous:

- 1. What does the acronym radar mean?**
*RADAR means **R**adio **D**etection **a**nd **R**anging.*
- 2. What's the difference between a battleship and a destroyer?**

A battleship is a large, armored warship with large-caliber guns designed to achieve dominance of the sea. Typical WWII battleships were armed with 16-inch guns.

A destroyer is a small, fast and maneuverable warship originally designed to protect the fleet against torpedo boat attacks.

In WWII, destroyers were armed with 5-inch guns and evolved into effective anti-submarine warships.

3. When can we visit the engine rooms?

The issue is accessibility and making them safe for visitors. Funding to open is estimated at \$1M.

4. Who installed the basketball net?

The 1980s crew.

5. What are the black openings on the superstructure?

Main engine and machinery room air intakes.

H. For the Crew:

1. Where can I find work rules, policies, and related information?

Consult the Crew Training Guide, Employee Handbook, PBC Policy Manual (at info.onboard.labattleship.com) and departmental policies and procedures.



USS *Iowa* (BB-61) underway in rough seas during NATO *Exercise Ocean Safari '85*. Sept. 1, 1985

Suggested Reading

Books

Fortress Rabaul: The Battle for the Southwest Pacific, January 1942-April 1943, Bruce Gamble

Freedom's Forge: How American Business Produced Victory in World War II, Arthur Herman

Iowa-Class Battleships - On Deck series, by David Doyle, Squadron Signal

Iowa Class Battleships - Their Design, Weapons & Equipment, Robert F. Sumrall, Naval Institute Press

Islands of Destiny: The Solomons Campaign and the Eclipse of the Rising Sun, John Prados

Neptune's Inferno: The US Navy at Guadalcanal, James Hornfischer

Pacific Crucible: 1941-1942, Ian Toll

Santa Cruz, Mark Stille

Shattered Sword: Untold Story of the Battle of Midway, Parshall, Tully

The Admirals: Nimitz, Halsey, Leahy, and King - The Five-Star Admirals Who Won the War at Sea, Walter R. Borneman

The Battle for Leyte Gulf, C. Vann Woodward

The Iowan History Letter, The Birth of a Ship;
1st Quarter, 2013

The Last Stand of the Tin Can Sailors, James Hornfischer

US Battleships, An Illustrated Design History, Norman Friedman, Naval Institute Press

US Battleships 1941-1963, An Illustrated Technical Reference, Wayne Scarpaci

US Fast Battleships 1938-91, The Iowa Class, Lawrence Burr, Osprey Publishing, New Vanguard 172

US Fast Battleships 1936-47, The North Carolina and South Dakota Classes, Lawrence Burr, Osprey Publishing, New Vanguard 169

USS Iowa at War, Kit and Carolyn Bonner, 2007

Websites

Battleship IOWA

<http://www.pacificbattleship.com>

Directory of American Fighting Ships

<http://www.hazegray.org/danfs/>

Historic Naval Ships Association

<http://www.hnsa.org>

Naval History and Heritage Command

<http://www.history.navy.mil/index.html>

NavSource Naval History

<http://www.navsource.org>

USS Iowa Veteran's Association

<http://www.ussiowa.org>

USS. Massachusetts (BB-59) - WWII Battleship Living History Group

http://ussmasslhg.com/Home_Page.html

USS North Carolina (BB-55) WWII Living History Crew

<http://www.usnclivinghistory.com/index.html>

United States Military Uniforms of World War II

<http://usww2uniforms.com/index.html>

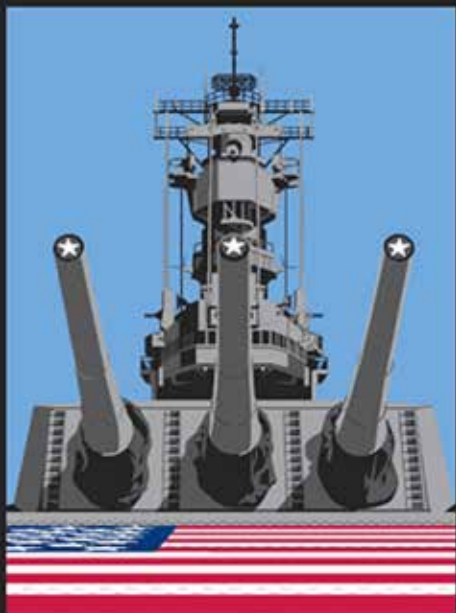


Gun Crew Loading a 5" 38 Caliber Gun

The original is an oil on canvas painting
US Navy recruiting poster (1940-1942)
LCDR McClelland Barclay (artist) : 1891-1942
Killed in Action, Solomon Islands, 1942

Note: The name of the painting is **Gun Crew Loading a 5" 38 Caliber Gun** even though the gun is not a 5"/38.

BATTLESHIP
IOWA



LOS ANGELES